

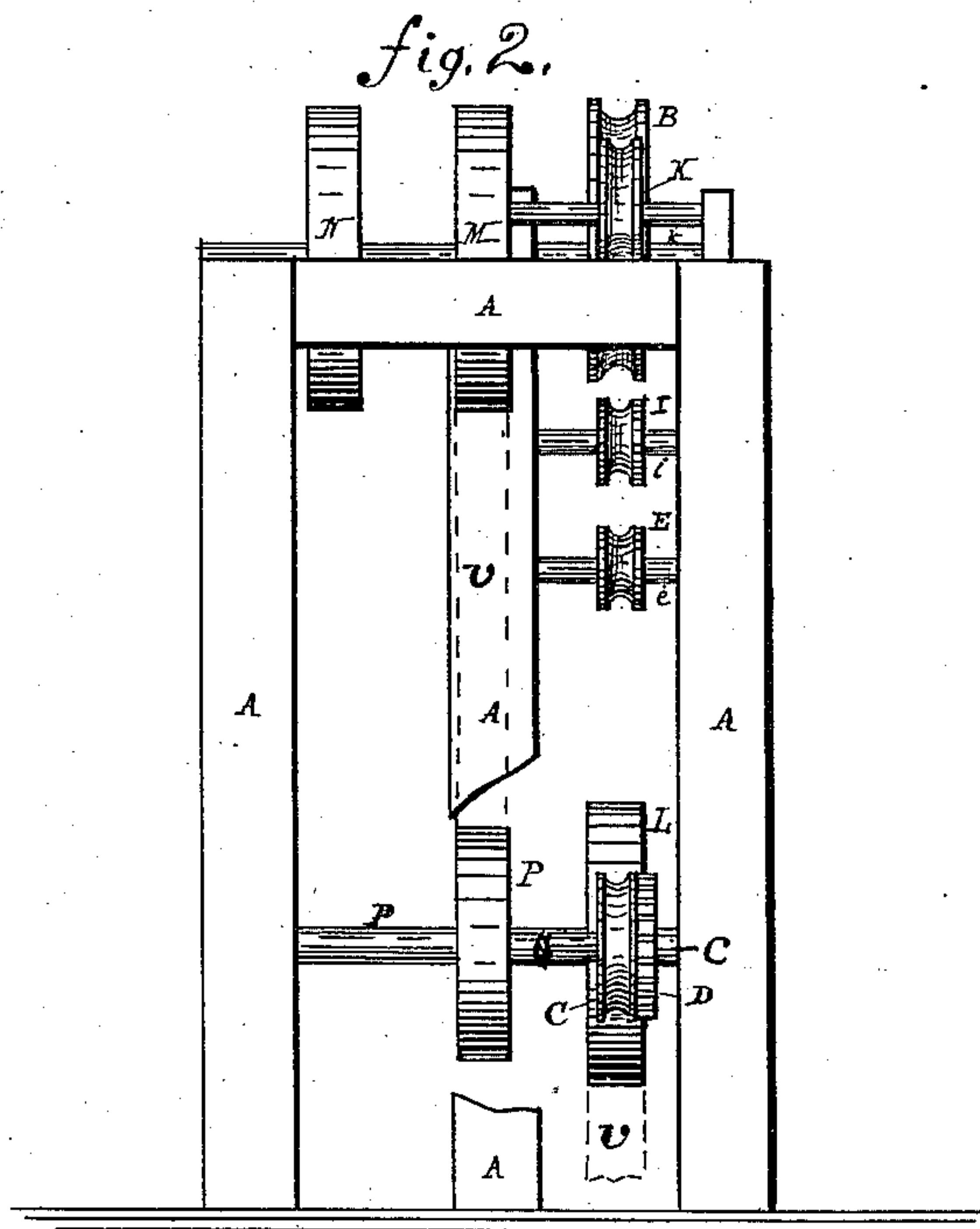
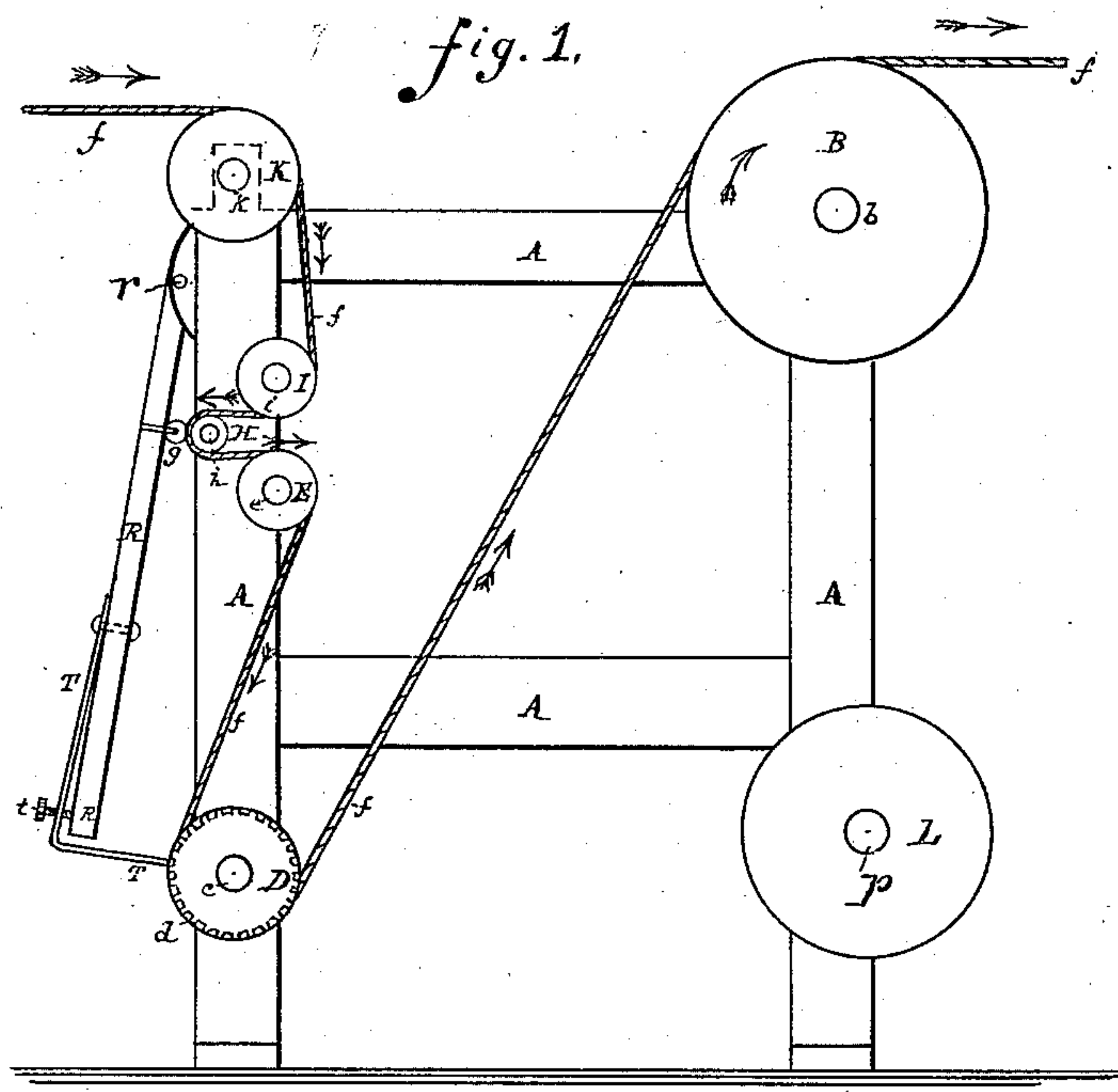
(No Model.)

A. F. ANDREWS.

MACHINE FOR CALIBRATING THE FUSE USED TO EXPLODE GUNPOWDER.

No. 358,371.

Patented Feb. 22, 1887.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

ALBERT F. ANDREWS, OF AVON, CONNECTICUT, ASSIGNOR TO THE CLIMAX  
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MACHINE FOR CALIBRATING THE FUSE USED TO EXPLODE GUNPOWDER.

SPECIFICATION forming part of Letters Patent No. 358,371, dated February 22, 1887.

Application filed August 5, 1886. Serial No. 210,158. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT F. ANDREWS, a citizen of the United States, residing at Avon, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Machines for Calibrating the Fuse Used to Explode Gunpowder, and also applicable for the calibration of other similar rope-like material.

The following specification, taken in connection with the drawings herewith attached and forming a portion thereof, completely sets forth my invention.

The object of my invention is to provide a machine that will automatically calibrate or test the diameter of the safety-fuse used for blasting purposes, and announce to the operator when the fuse is too small in diameter.

The necessity for a certain uniformity in the diameter of the fuse used for blasting and other purposes depends upon the fact that when the fuse becomes less than a certain determined size, depending upon the nature and thickness of the material used in its formation, the powder-trail becomes too small or its continuity ceases.

My machine is designed to automatically inspect the fuse at a very rapid rate and announce to the operator any important diminution in the diameter of the fuse as it passes through the machine, indicating a deficiency in powder-charge. I accomplish this result by causing the fuse to be unwound from a drum and to pass over several friction-pulleys, finally passing under a roller attached to a swinging lever, which lever is allowed to fall forward when the fuse becomes of too small diameter and thus bring an adjustable spring on its end in contact with the teeth of a toothed wheel attached to one of the drums, which by giving out a loud buzzing or humming noise announces the defect to the operator.

In the drawings, Figure 1 is a side elevation of the machine, the side of the frame nearest the spectator being removed to show the working parts more clearly. Fig. 2 is a front end elevation of the machine, the lever being removed.

Similar letters refer to like parts in both views.

The machine consists of a simple wood frame, A, having mounted at the top of its rear por-

tion a large grooved-edge pulley, B, which is keyed to a shaft, *b*, and driven from the main shafting through the pulley M, also keyed to the same shaft, *b*, and the pulleys P and L, placed upon a lower shaft, *p*. A pulley, N, is also keyed to the shaft *b*, to drive a drum (not shown in the drawings) upon which the fuse is wound after passing over B. The pulley L, driven from any convenient source of power, communicates its motion to the pulley P, keyed to the same shaft, and the pulley P is in turn belted to the pulley M.

C, E, H, I, and K are grooved friction-pulleys turning freely in suitable bearings in the frame. *c*, *e*, *h*, *i*, and *k* are the respective shafts upon which these pulleys are mounted. *f* is the fuse.

R is a freely-swinging lever pivoted to the frame A, at *r*, and carrying at its lower end a spring, T, adjustable by means of a set-screw, *t*, and just clearing, when the fuse is of the proper diameter, the teeth *d* of a wheel, D, which is secured to the shaft *c*, face to face with the pulley C. The small set-screw *t* permits of the adjustment of the lever for fuse of different diameter. A small friction-roller, *g*, is mounted so as to turn freely near the upper end of this lever R, and is placed so as to be in contact with the fuse *f* as it passes over pulley H.

The fuse is passed first over the pulley K, then under the pulley I, over pulley H, between it and the friction-roller *g*, attached to the lever R, over pulley E, under pulley C, and finally over pulley B, whence it passes to the drum upon which it is wound.

*v v* indicate belts.

The operation is as follows: The machine being threaded with the fuse, as shown, entering at pulley K and passing out at pulley B, and the spring M being adjusted so that its free end is very near but not actually in contact with the toothed wheel D, the machine is started, the pulley B revolves and pulls the fuse along. The friction of the fuse turns the pulleys and rollers as it passes over them. As long as the fuse is of uniform diameter the lever R remains quietly at rest; but if the fuse is defective in size at any portion of its length the roller *g* approaches the roller H, and the end of the spring T is permitted to come in contact with the teeth of the wheel D, causing



it to vibrate rapidly, producing a loud noise and warning the operator of the defect.

It is obvious that the parts might be varied somewhat without varying the result, and the lever R might also be adapted to form an electric contact and ring a bell, if required.

Having now fully described my invention, what I claim, and desire to secure by Letters Patent, is—

10 1. A machine for calibrating fuse and for other similar purposes, comprising a frame, a lever pivoted to said frame and carrying a roller, and a series of rollers on said frame, certain of these rollers being driven by any convenient means to feed the fuse through the machine  
15 and one of them being provided with an alarm mechanism, said lever pressing by means of its roller on the fuse as it passes over one of the said rollers and being adapted to give an alarm  
20 if the fuse is of less than the standard size.

2. A machine for calibrating fuse and for similar purposes, comprising a frame and a series of grooved rollers mounted thereon, a lever pivoted to the frame and pressing against

the fuse as it passes over an idle-roller, and a spring attached to said lever so as to come in contact with the teeth of a wheel and give out a loud sound whenever the fuse is of less than the standard diameter.

3. A machine for calibrating fuse, constructed and operated substantially as described, and comprising a frame, A, upon which is mounted the power-driven pulley B, and the idle-pulleys or friction-wheels C, E, H, I, and K, the toothed wheel D, and the freely-  
35 swinging lever R, pivoted at *r* to the frame, pressing against the fuse by a roller, *g*, and provided at its lower end with an adjustable spring, T, which can come into contact with the teeth of the wheel D and give an alarm  
40 when the fuse is of less than any previously-determined diameter.

In witness whereof I have hereunto set my hand.

ALBERT F. ANDREWS.

Witnesses:

HENRY CLARK,

GEORGE A. SAUNDERS.